Meeting #8 Summary

THE MASSACHUSETTS DISTRIBUTED GENERATION INTERCONNECTION COLLABORATIVE

Friday, January 17, 2003
Room 104
The Massachusetts Technology Collaborative
Westboro, MA

28 people attended the meeting, which began at 9:30 and ended at 4:00. See attached attendance list.

I. Documents Distributed

Prior to the meeting

a. Meeting Summary from 1.10 Meeting

At the meeting

a. Revised Figure 1 and Notes – Radial Work Team
b. Summary of Deliberations on Network Issues – Network Team
c. Proposed Application Form – Jim Watts
d. Information Tracking Proposal – Information-Tracking Team

II. Opening Remarks

Dr. Jonathan Raab, the Collaborative facilitator, indicated that the purpose of the meeting was to review the progress of the working groups Working Teams that met on January 16 at the MTC. Specifically, the day's agenda would include:

?? Review Radial Work Team progress
  - Look at Figure 1
  - New narrative section, and notes

?? Network Work Team progress
  - New Figure 2
  - Timing table
  - Cost table
  - Principles/goals for the future)

?? Application form

?? ADR Work Team progress
  - ADR approach
  - Agreement
  - Compliance/Incentives

?? Information Group Work Team progress
  - Tracking
  - Long-term

III. Review of Radial Group Results

Dr. Raab walked the group through the changes the Work Team made to Figure 1 and the accompanying notes (see Appendix 1 below). Group Members indicated that there should be an additional note to box 4 indicating where interested parties can learn whether a machine is pre-certified. The Radial Group will draft such a note for the next meeting. Members also requested that the Radial Group finish its work on Note 4.

Dr. Raab also very briefly reviewed a narrative text that would preface and describe Figure 1 and the Notes (See Appendix 2 below). Although the Group did not discuss the narrative in depth, Members agreed that this was worth doing and suggested that the narrative should also describe what the time frames and the fees cover, and that it should explain when the clock for providing information starts and stops. Also, the design review estimates need to be clearly included in the estimates.

The Group explored a variety of ways to finally resolve the cloud in Figure 1 including:

- Insert "See note 7" into the expedited interconnection box at the bottom.
- Replace the cloud with some other figure with the words "system modification check - See note 7(c)"

Not having arrived at a decision, the Group sent the issue back to the Radial Work Team.

IV. Review of Network Group Results

Dr. Raab reviewed the goals and recommendations developed by the Network Group. These recommendations included a rough schematic diagram outlining an expedited process for interconnecting small inverter-based systems to spot networks. This also included a preliminary timetable and cost schedule (see Appendix 3).

The Group discussed the proposed timeframes and cost schedules. Some members expressed that the $300 application fee for small systems seems excessive, and that the Group ought to consider $100 for systems 3 kW and smaller, with systems between 3 kW and 10 kW paying $300. Members also inquired whether the time frames could be shortened.

One Member indicated that those proposing DG systems in network areas would benefit from some sort of a document explaining precisely what would be necessary (e.g. the types of protective devices, system upgrades, load requirements, etc) to execute successfully a network interconnection .The document could also provide bullet points listing challenges and hurdles for network interconnections as opposed to radial. An Appendix highlighting network challenges for potential customers on might also prove useful.

Building on the idea, the Group suggested a potential outline for the chapter of the report dealing with network issues as follows (drafters of specific pieces are identified in brackets):

1. Opportunities and Challenges for DG on Network Systems, including why interconnecting to networks is more complicated than to radial systems [Navigant and NStar]
2. Interconnection Goals [Network Team]
3. Expedited Process (fig. 2 + text + notes + tables) for circumstances and machines with which the Group is comfortable right now. [Network Team]
4. Going Forward – How improve the network interconnection regime over time. [Network Team]
5. An attachment for potential DG customers interested in network interconnections that spells out more clearly the hurdles customers will need to overcome order to do so. [Navigant]
6. Identify pilot network projects. [Network Team]

The Group then discussed the Goals specified by the Work Team, which are contained in Box 1. One or more members voiced the following comments, questions, and concerns, which do not necessarily represent a consensus of the Group:

Box 1: Goals that should guide development of interconnection standards on the network.

Developed by the Network Work Team, 1.16.2003

a. Maintain the same level of system reliability of network service.
b. Maintain the same level of safety to the Utility work force and public as at present.
c. Seek efficient and cost-effective approaches for interconnecting on networks.
d. Develop a process that allows a Customer/Installer to determine within a cost-effective timeframe whether a given project is viable economically and procedurally.
e. Facilitate interconnection where DG could enhance the reliability of the system.
f. Explore collectively the opportunities and challenges of network interconnection through pilot projects, studying interconnections throughout the country, and studying alternative interconnection techniques.
g. Explore approaches for expediting interconnection on area networks for inverter and induction generators.

?? The first two goals should be applied to all processes, not just those involving network systems.
?? Clarify the meaning of "efficient" under bullet *c.*
?? The IEEE guide for understanding networks could prove an accessible reference for understanding the network for those less familiar with such systems. (Stan Blazewicz from Navigant will circulate the document to the Group).
?? Make sure that the terms and definitions used in the goals are the same as in other areas of the process, or that if they are different they are deliberatively chosen so.

Last, the Group reviewed the Work Team's proposed figure 2 (See Appendix 3). Members asked whether a network applicant who puts in technical fixes to isolate the facility from the network would be returned to the radial process. No one had an immediate answer for this.

One Member added that no similar expedited process exists for network, and this process should be viewed as a pilot. This led to a broader discussion regarding what would happen to the processes designed by the Collaborative if technical problems arise during implementation. Specifically, would the Companies have the right to unilaterally change the processes? It was noted that this is not simply a network or inverter issue. Again, the Group did not resolve this issue but flagged it for further thought.

V. Discussion of Application

Jim Watts very briefly reviewed the three-part (Simplified, Expedited, Standard) draft application that he began developing (click to view). Mr. Watts and Tim Roughan will continue to work on the application. The Group also raised the question of how environmental permits should be integrated into the application, if at all.

VI. Discussion of ADR and Interconnection Agreement Work Team Progress

Suzanne Orenstein provided an overview of the ADR Work Team's deliberations. A brief outline of the ADR Work Team's report is captured in Box 2 below.

Box 2: ADR Proposal developed by the 1.16 ADR Work Team

Steps:

1. Negotiation, with elevation if necessary (10-15 business days)
2. Third-party informal dispute resolution (30-45 business days)
   - ?? Facilitation/mediation, with recommendation by neutral if no agreement is reached.
   - ?? Neutrals from a pre-approved list of technically competent professionals
   - ?? DTE as possible informal process facilitator
   - ?? If recommendation or agreement is rendered, it becomes binding if both sides accept it. If it is not accepted by both parties, the dispute goes to Step 3.
3. DTE hearing

Other comments/points

- ?? Dispute resolution starts when one party requests it or notifies the other party about the dispute in writing
- ?? Schedules can always be extended by mutual consent
- ?? The agreement is not confidential, but will not reveal confidential business information if the parties request it
- ?? Time limits may be revisited after experience with system

One or more members of the Group offered the following comments, questions, and suggestions, which do not necessarily represent a consensus of the Group:

- ?? Note that there will be a technical expert that can either facilitate or provide input to the facilitator on technical issues.
- ?? Regarding the DTE serving as a facilitator – what do people think?

- For Utilities, it is difficult to have informality at the DTE; they prefer a private mediator.

?? Can DTE/DOER/others assist at the negotiation phase?
?? Flesh out what constitutes "negotiation"
?? What should be the importance of precedence in the negotiation/mediation phase?
- Stronger precedential value will likely translate to greater difficulty in reaching a settlement, potentially leading to a longer settlement period.
- Look at the issue in the annual review.

?? Should transparency be provided once there is a settlement? What goal is being met through transparency?
?? Strive for "limited" transparency to safeguard the confidentiality of trade secrets.
?? How should costs be shared?

The Group then turned its attention to the Work Team's review of its progress on the interconnection agreement. The Work Team noted that the agreements were highly dependent on the technical interconnection requirements. Again, the Group offered the following comments, questions, and suggestions, but they but do not necessarily represent a consensus of the Group:

?? On "Issues to cover", add costs, operating instructions, site access, other Exhibits (e.g. maintenance).
?? Make sure the agreement specifies operating requirements.
?? Have different agreements for simplified processes (including the terms and conditions needed) and all others.
?? Radial group will work on technical requirements for simplified and others. ADR is working on legal terms and conditions.

VII. Discussion of Information Tracking

Gerry Bingham gave an overview of what the Information Tracking Group did on Jan 16. Mr. Bingham reiterated that the intent of the information tracking provisions is to create the basis for an on-going review processes.

One potential means of fulfilling that goal is through a company tracking spreadsheet that could perhaps be filed annually with the DTE or some other body and shared with the Collaborative. Stakeholders could meet quarterly or semi-annually to review experience in Massachusetts and elsewhere. Some Members expressed a preference for meeting after a pre-determined number of interconnections (e.g. 60 per year or 15/utility). A suggestion was made that other stakeholders not represented at the Collaborative be invited to join, as well as perhaps DTE staff.

Tim Roughan then reviewed a proposed information tracking spreadsheet (click to view). The proposal would track the name, address, size, fuel source, dates of action on specific application points, person-hours required to complete the project, and miscellaneous notes related to the project. These data points would be available for both expedited and simplified interconnections.

Group members offered several suggestions for improving the proposal:

- Track what system modifications are necessary and how much they cost.
- Track technology type as a column.
- Track failed screens (Identify which ones)
    - Who should track these?
- Have a common database across all the utilities
- Could the MTC compile a database across all the utilities?
- Quarterly seems too soon to meet; should be semi-annually, partly a function of the number of applicants (e.g. 60/year or 15/utility).
- Keep the process informal; don't involve the DTE.

There was a lengthy discussion about whether or not this type of tracking would be too burdensome for the utilities.

VIII. To-Do

In closing, the Group developed an extensive To-Do list for work leading up to the next Plenary meeting on January 29. The list includes action items for the work teams.

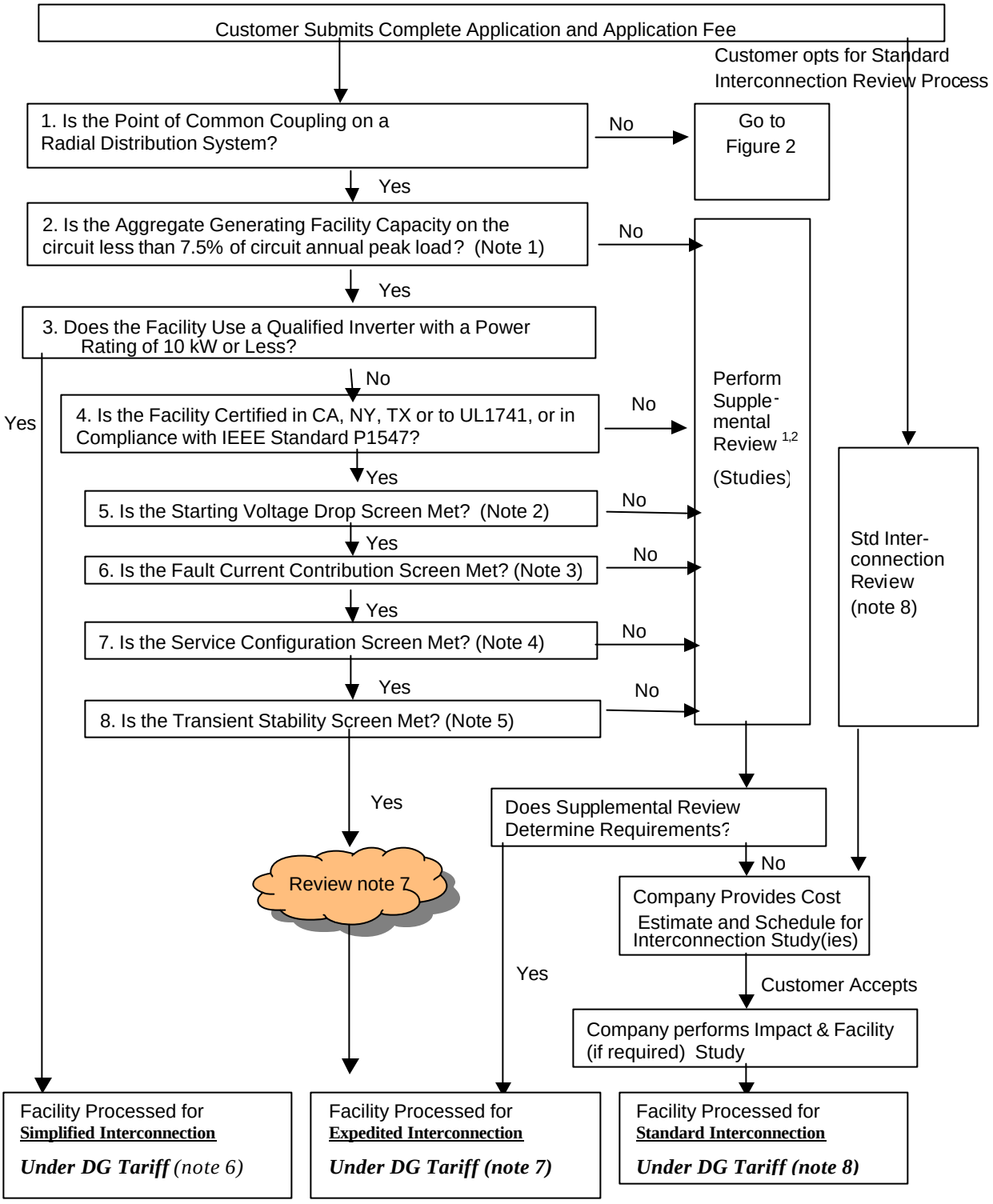
a. Meeting summary – Raab Associates
b. Agenda for 1/29—Raab Associates
c. Radial Group:
    i. Narrative/Figure 1/Notes – Raab Associates
    ii. Additional note to box 4 – Radial Work Team
    iii. Finalize note 4 – MECo/Radial Work Team
    iv. Cost/Timing table – All review
    v. Application – Tim/Jim
    vi. Interconnection Requirements (Structure and Details) – Navigant
    vii. Interconnection Requirements (Details) – Utilities/DG Cluster
    viii. Agreement (technical terms) – Navigant
    ix. Queuing – All for now
    x. Conference Call wed 3pm
    xi. Meeting 1/27 9am at MTC
d. Network Group:
    i. Opportunities/Challenges – Navigant/Nstar/Bzura
    ii. Goals
    iii. Expedited (text, figure 2, changes to timing/costs) – All
    iv. Process going forward – All
    v. Attachment for potential DG/customers interested in interconnecting – Navigant
    vi. Identify pilot network projects for case studies – All
    vii. Meeting Tuesday 1/28, Joel will get back on the time
    viii. Stan Blazewicz from Navigant will circulate the document to the Group
e. ADR Group:
    i. Figure out how transparency fits into the process
    ii. Refine role of DTE in the process

iii. Flesh out what constitutes “negotiation”
iv. Work on costs
v. Work on agreements for simplified processes
vi. Figure out what precedence the ADR process should have.
vii. Work on “Issues to cover” in agreement: Add costs, operating instruction, site access, Exhibits (maintenance).
viii. Propose agreements on different processes
ix. Develop legal terms and conditions for the agreement
x. Meeting 1/22 Wed (1:30 – 5:00) at Nstar
xi. Conference call TBD after meeting to finalize draft proposal for distribution prior to next meeting

f. Information Tracking Group:
i. Design formal review/DTE
ii. Collaborative/informal review
iii. Tracking concerns (definition, content, spreadsheet, confidentiality)
iv. Environmental permit
v. Confidentiality, content - DG cluster
vi. Conference call, Tuesday, 1/21, 9am –10am (978-431-1111 code 623)

Appendix 1: Figure 1 and Notes, as revised at 1.17 meeting

Figure 1: Schematic of Proposed Process for DG



[1] Even if a proposed project initially fails a particular screen in the expedited process, if supplemental review shows that it can return to the expedited process then it will do so.

[2] Supplemental review occurs when the Generating Facility fails one or more of the process screens. Supplemental review will determine if the Generating Facility can still be interconnected safely and reliably through the expedited process within the time allotted to perform the supplemental review. If this cannot be done, the Company will provide a cost estimate and schedule for an Interconnection Study and enters Standard Interconnection Review.

Notes to Accompany Figure 1
Edited in plenary, 1.17

Note 1. On a typical radial distribution system circuit ("feeder") the annual peak load is measured at the substation circuit breaker, which corresponds to the supply point of the circuit. A circuit may also be supplied from a tap on a higher-voltage line, sometimes called a subtransmission line. On more complex radial systems, where bidirectional power flow is possible due to alternative circuit supply options ("loop service") the normal supply point is the loop tap.

Note 2. This screen only applies to Generating Facilities that start by motoring the Generating Unit(s) or the act of connecting synchronous generators. The voltage drops should be less than the criteria below. There are two options in determining whether Starting Voltage Drop could be a problem. The option to be used is at the Companies' discretion:

Option 1: The Company may determine that the Generating Facility's starting Inrush Current is equal to or less than the continuous ampere rating of the Facility's service equipment.

Option 2: The Company may determine the impedances of the service distribution transformer (if present) and the secondary conductors to the Facility's service equipment and perform a voltage drop calculation. Alternatively, the Company may use tables or nomographs to determine the voltage drop. Voltage drops caused by starting a Generating Unit as a motor must be less than 2.5% for primary interconnections and 5% for secondary interconnections.

Note 3. The purpose of this screen is to ensure that fault (short-circuit) current contributions from all DG units will have no significant impact on the Company's protective devices and system. All of the following criteria must be met when applicable:

1. The proposed Generating Facility, in aggregation with other generation on the distribution circuit, will not contribute more than l0% to the distribution circuit's maximum fault current under normal operating conditions at the point on the high voltage (primary) level nearest the proposed point of common coupling.
2. The proposed Generating Facility, in aggregate with other generation on the distribution circuit, will not cause any distribution protective devices and equipment (including but not limited to substation breakers, fuse cutouts, and line reclosers), or customer equipment on the system to exceed 85% of the short circuit interrupting capability. In addition, the proposed Generating Facility will not be installed on a circuit that already exceeds 85 percent of the short circuit interrupting capability.
3. When measured at the secondary side (low side) of a shared distribution transformer, the short circuit contribution of the proposed Generating Facility must be less than or equal to 2.5% of the interrupting rating of the Companies' Service Equipment.

Coordination of fault-current protection devices and systems will be examined as part of this screen.

Note 4. This screen includes a review of the type of electrical service provided to the customer, including line configuration and the transformer connection.

For interconnection of a proposed single-phase generator where the primary distribution system is three-phase, four-wire, the generator will be connected line-to-neutral. For interconnection of a proposed single-phase generator where the primary distribution system is three-phase, three-wire, the generator will be connected line-to-line.

For interconnection of a proposed three-phase generator to a three-phase, four- wire distribution circuit or a distribution circuit having mixed three-wire and four-wire sections, the aggregate generation capacity including the proposed generator will not exceed 7.5% of line section design capacity. A line section is defined by the change from a three to a four- wire section (or vice-versa). ???, MECo

If the proposed generator is to be interconnected on a single-phase transformer shared secondary, the aggregate generation capacity on the shared secondary, including the proposed generator, will not exceed 20 kVA.

If the proposed generator is single-phase and is to be interconnected on a center tap neutral of a 240 volt service, its addition will not create an imbalance between the two sides of the 240 volt service of more than 20% of nameplate rating of the service transformer.

Note 5. The proposed generator, in aggregate with other generation interconnected to the distribution low voltage side of the substation transformer feeding the distribution circuit where the generator proposes to interconnect, will not exceed 10 MW in an area where there are known or posted transient stability limitations to generating units located in the general electrical vicinity (e.g., 3 or 4 transmission voltage level buses from the point of interconnection).

Note 6. This new **Simplified Interconnection** process has five steps:

1. Application process:
    a. Customer submits an Application filled out properly and completely.
    b. Company acknowledges to the customer receipt of the application within three business days.
    c. Company evaluates the Application for completeness and notifies the customer within 10 days.
2. Company verifies Generating Facility equipment passes screens 1, 2, and 3.
3. Company and customer execute agreement (if an agreement is required by the Collaborative).

4. Upon receipt of signed agreement and completion of installation, Company may inspect Generating Facility for compliance with standards and arrange for a witness test.
5. Assuming inspection/test is satisfactory, Company notifies Customer that interconnection is allowed, and approves.

Note 7.

The Expedited Interconnection process has eight steps:

1. Customer submits an Application filled out properly and completely.
2. Company acknowledges the application within three business days of receipt and evaluates the Application for completeness within 10 days of receipt.
3. Company then conducts an initial review which includes applying the screening methodology (screens 1 through 8) *Notice: The Company reserves the right to conduct additional studies if deemed necessary and at no additional cost to the Customer, such as but not limited to: protection review, aggregate harmonics analysis review, aggregate power factor review and voltage regulation review*. As part of the expedited interconnection process, the Company will assess whether any system modifications are required for interconnection, even if the project passes all of the eight screens. If the needed modifications are minor, that is, the requirement can be determined within the time allotted through the application fee, then the modification requirements, reasoning, and costs for these minor modifications will be identified and included in the executable expedited interconnection agreement. If the requirements cannot be determined within the time and cost alloted in the initial review, the Company may require that the project undergo additional supplemental review to determine those requirements within the time allocated for supplemental review (maximum 10 hours of engineering time). If after these reviews, the Company still cannot determine the requirements, the Company will document the reasons why and will meet with the customer to determine how to move the process forward to the parties' mutual satisfaction. In all cases, the Customer will pay for the cost of modifications that are attributable to its proposed project.
4. Assuming all screens are passed, Company sends the Customer an executable agreement and a quote for any required system modifications or reasonable witness test costs.
5. If one or more screens are not passed, the Company will offer to conduct a Supplemental Review. If the Customer agrees to pay the Supplemental Review Fee, the Company will conduct the review. If the Supplemental Review determines the requirements for processing the application through the expedited process including any system modifications, then the modification requirements, reasoning, and costs for these modifications will be identified and included in the executable expedited interconnection agreement. If this is not true, the supplemental review will include an estimate of the cost for the studies that are part of the standard review process.
6. Customer returns signed agreement, completes installation, and pays any system modification costs identified in the agreement.

7. Company inspects completed installation for compliance with standards and attends witness test, if required.
8. Assuming inspection is satisfactory, Company notifies Customer that interconnection is allowed.

Note 8. Standard Review Process (This section not yet reviewed by Radial Working Team or Full Group)

Customers may choose to proceed immediately to the standard review process. The Company will conduct a scoping meeting/discussion with the customer (if necessary) to review the application within 15 business days of receiving a completed application. At the scoping meeting the Company will provide:

1) the available fault current at the proposed location; and
2) the existing peak loading on the lines in the general vicinity of the facility.

After the scoping meeting, the customer and Company will decide whether the customer should skip the feasibility study and proceed directly to a system impact study. Within an additional 5 business days, the company will provide an estimate for the appropriate study as well as a study agreement. Any costs not expended from the application fee previously collected (costs for the scoping meeting, and additional costs to determine 1 and 2 above) will go toward the costs of the study.

Appendix 2
Proposed Process for DG Interconnection in Massachusetts

There are three basic review paths for interconnection in Massachusetts described below and detailed in Figures 1 and 2 with their accompanying notes. Figures 3 and 4 describe the timelines and fees respectively for these paths.

1. **Simplified** – This is for qualified inverter-based facilities with a power rating of 10 kW or less on radial systems under certain conditions.
2. **Expedited** – This is for certified facilities that pass certain pre-specified screens on a radial system, or inverter based systems with a power rating of 10 kW or less on spot network systems under certain conditions.
3. **Standard** – This is for all facilities not qualifying for either the simplified or expedited interconnection processes on radial and spot network systems, and for all facilities on area network systems.

All customers must submit a completed application and the appropriate application fee to the Company it wishes to interconnect with. Customers who are not likely to qualify for Simplified or Expedited review may opt to go directly into the Standard review path. Customers proposing to interconnect on area networks will also go directly to Standard review. All other customers must proceed through a series of screens to determine their ultimate interconnection path.

Customers using qualified inverter-based facilities of power ratings of under 10 kW requesting an interconnection on radial systems where the aggregate generating facility capacity on the circuit is less than 7.5% of circuit annual peak load qualify for Simplified interconnection. This is the fastest and least costly interconnection path.

To Be Continued (Note Dr. Raab only shared the narrative up to this place, and promised to circulate draft document to entire Group the following Tuesday)

Appendix 3: Spot Networks Interconnection Timeframes, Cost Schedule, and Schematic Diagram

Table 1: Time Frames, Modified for Spot Network Systems[1,2]

Criteria for Process Classification	**Based on Evaluation of Technical Screens**		**Applicant Option**	
Review Process	Simplified	Expedited	Standard Review	Expedited Spot Network
Eligible Facilities	Certified Inverter < 10 kW	Qualified DG	Any DG	Certified Inverter < 10 kW
Acknowledge receipt of Application	(3 days)	(3 days)	(3 days)	(3 days)
Review Application for completeness	10 days	10 days	10 days	10 days
Complete Review of Screens 1-9	10 days	25 days	n/a	Site review (placeholder) 30/90 days[3]
Complete Supplemental Review (if needed)	n/a	20 days	n/a	N/a
Complete Standard Interconnection Process Initial Review	n/a		20 days	n/a
Send Follow-on Studies Cost/Agreement	n/a		5 days	n/a
Complete Impact Study (if needed)	n/a		55 days	n/a
Complete Facility Study (if needed)	n/a		30 days	n/a
Send Executable Agreement[4]	Done	10 days	15 days	Done (comparable to simplified radial)
Total Maximum Days[5]	15 days	40/60[6,7]	125/150 days[8]	40/100 days

[1] All days listed apply to Utility work days under normal work conditions. All numbers in this table assume a reasonable number of applicants under review. Any delays caused by IC Customer will interrupt the applicable clock. Moreover, if an IC Customer fails to act expeditiously to continue the interconnection process or delays the process by failing to provide necessary information within a reasonable time (e.g. fifteen days), then the Utility may terminate the application and the IC Customer must re-apply. However, the utility will be required to retain the work previously performed in order to reduce the initial and supplemental review costs incurred.

[2] Some members of the DG cluster have not agreed to the timeframes outlined in the schedule.

[3] 30 days if load is known, 90 if it has to be determined.

[4] Utilities deliver an executable form. Once an executable agreement is delivered by the utility any further modification and timetable will be established by mutual agreement.

[5] Actual totals laid out in columns exceed the maximum target.

[6] Shorter time applies to Expedited w/o supplemental review, longer time applies to Expedited with supplemental review.

[7] The parties agree that the maximum days are 40/60. The parties will endeavor to establish what a reasonable average number of days is by the final filing if possible. The parties further agree that average days (fewer than maximum days) is a performance metric that will be tracked.

Notice/ Witness Test	< 1 day with 10 day notice or by mutual agreement	1-2 days with 10 day notice or by mutual agreement	By mutual agreement	1-2 days with 10 day notice or by mutual agreement (?)

Table 2: Commercial Terms [9]

Criteria for Process Classification	Based on Evaluation of Technical Screens		Applicant Option	
Review Process	Simplified	Expedited	Standard Interconnection Process Review	Expedited Spot Network
Eligible Facilities	Certified Inverter < 10 kW	Qualified DG	Any DG	Certified Inverter < 10 kW
Application Fee (covers screens)	0	$3/kW with minimum fee $300, maximum fee $2,500	$3/kW with minimum fee $300, maximum fee $2,500	<$300??
Supplemental Review (if applicable)	n/a	Up to 10 engineering hours at $125/hr ($1,250 max)[10]	n/a	n/a
Standard Interconnection Initial Review	n/a	n/a	Included in application fee (if applicable)	n/a
Impact and Facility Study (if required)	n/a	n/a	Actual cost[11]	n/a
Facility Upgrades	[12] n/a	Actual cost	Actual cost	n/a

[8] The parties agree that although the maximum days are 125/150. The parties will endeavor to establish what a reasonable average number of days is by the final filing if possible. The parties further agree that average days (fewer than maximum days) is a performance metric that will be tracked.

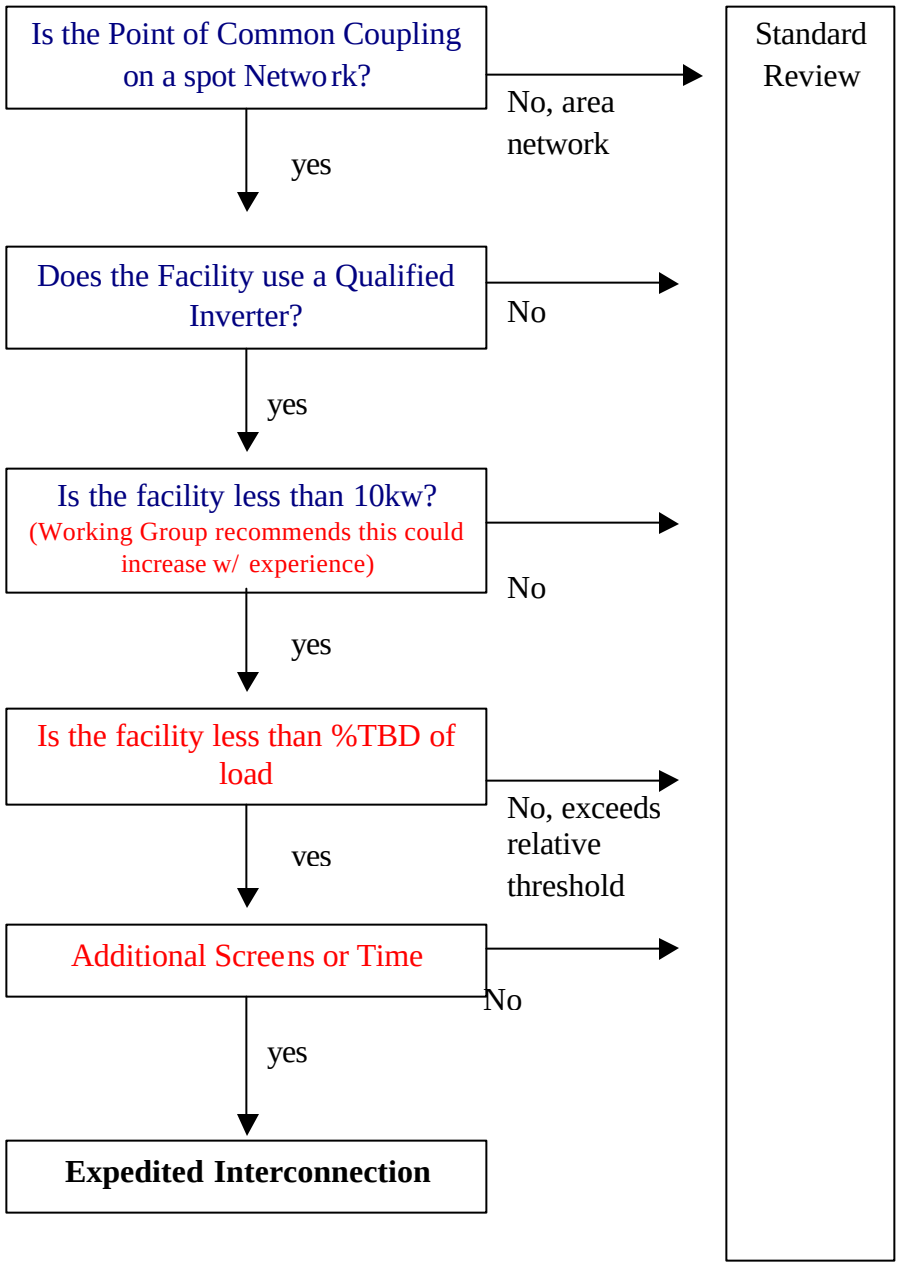
[9] Some members of the DG cluster did not agree to the fees in this table.

[10] For Supplemental Review, applicants will pay actual costs up to $1,250, which is based on a maximum of 10 engineer hours at an estimated $125/hour (pending utilities further verification in the next phase). If more study is needed, then the Utility will provide a cost estimate for the impact and/or feasibility studies.

[11] This is the actual cost only attributable to the applicant.

O and M	***n/a***	TBD	TBD	n/a
Witness test	0	TBD	Actual cost	0/TBD
ADR costs	TBD	TBD	TBD	TBD

Figure 2: Interconnecting <10kW Inverter-based machines to spot networks



[12] Not applicable except in certain rare cases where a system modification would be needed. If so, the modifications are the customer's responsibility.

Appendix x: Attendance

Organization	Name	1/10	1/16
DG PROVIDERS			
Aegis Energy Services	Spiro Vardakas	X	
SEBANE	Steve Cowell	X	
SEBANE (alternate)	Ed Kern	X	X
SEBANE/Zapotec (alternate)	Paul Lyons	X	
E-Cubed	Peter Chamberlain	X	X
E-Cubed (alternate)	Ruben Brown	X	
Ingersoll-Rand	Jim Watts	X	X
Ingersoll-Rand (alternate)	Jim Avery	X	
Ingersoll-Rand (alternate)	Tim O'Connell	X	
NAESCO	Don Gilligan		
Northeast CHP Initiative	Sean Casten	X	X
Turbosteam	Tim Walsh	X	
NECA	Larry Plitch		
NECA (alternate)	Tobey Winters		
Real Energy	Roger Freeman	X	X
Real Energy (alternate)	Tim Daniels	X	X
UTC	Herb Healy	X	X
UTC (alternate)	Heather Hunt		
Keyspan	Pat Crowe		
Keyspan	Joe Niemiec	X	
Keyspan	Chuck Berry		X
Keyspan	Rich Johnson		
Plug Power	Lisa Potter		
Plug Power	Rudy Stegemoeller		
Trigen Energy	Dave Doucette		
GOVERNMENT/QUASI GOVERNMENT			
DOER	Dwayne Breger		
DOER (alternate)	Gerry Bingham	X	X
DOER (alternate)	David Rand		
MTC	Sam Nutter	X	X
MTC (alternate)	Judy Silvia		
MTC (alternate)	Raphael Herz	X	
MTC (alternate)	Fran Cummings	X	X
MTC (alternate)	Quincy Vale		X
Attorney General's office	Joseph Rogers		
Attorney General's office	Judith Laster		
Attorney General's office	Patricia Kelley		
Cape Light Compact	Margaret Downey		
Cape Light Compact	Kitt Johnson	X	
DEM			

DTE	Paul Afonso		
CONSUMERS			
AIM	Angie O'Connor		
for Solutia and MeadWestVac Co.	Andy Newman		
for Wyeth	Lisa Barton		
for Wyeth	Susan Richter		X
UTILITIES			
Unitil/FG&E	John Bonazoli	X	X
Unitil/FG&E (alternate)	Justin Eisfeller		
ISO-NE	Henry Yoshimura		
ISO-NE (alternate)	Carolyn O'Connor		
ISO-NE (2nd Alternate	Eric Krathwohl		
NSTAR	Larry Gelbien	X	X
NSTAR (alternate)	Dave Dishaw	X	X
NSTAR (alternate)	Mary Grover	X	X
NSTAR (alternate)	Dan Butterfield	X	X
WMECO/NU	Doug Clarke	X	X
WMECO/NU (alternate)	Mary Duggan	X	
WMECO/NU (alternate)	Cindy Janke	X	X
WMECO/NU (alternate)	Steve Klionsky	X	
WMECO/NU (alternate)	Rich Towsley		
WMECO/NU (alternate)	Leo Rancourt	X	X
NGRID	Tim Roughan	X	X
NGRID (alternate)	John Bzura	X	X
NGRID (alternate)	Mary Grover	X	
NGRID (alternate)	Amy Rabinowitz	X	
NGRID (alternate)	Peter Zschokke	X	
PUBLIC INTEREST GROUPS			
UCS, MassPIRG, and CLF	Deborah Donovan	X	
UCS, MassPIRG, and CLF	Frank Gorke		
UCS, MassPIRG, and CLF	Seth Kaplan		
Mass Energy Consumers Alliance	Larry Chretien	X	
Mass Energy Consumers Alliance	Leslie Grossman		
COLLABORATIVE TEAM			
Raab Associates	Jonathan Raab	X	X
Raab Associates	Joel Fetter	X	X
Raab Associates	Colin Rule	X	X
Facilitation Consultant	Suzanne Orenstien	X	X
Navigant Consulting	Stan Blazewicz	X	X
Navigant Consulting	Eugene Shlatz	X	
OTHER			
Unaffiliated	Bill Feero	X	